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VILLENA, MARK	
ART UNIT	**PAPER NUMBER**
2626	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/090,544	JOHNSTON ET AL.	
	Examiner	**Art Unit**	
	MARK VILLENA	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 January 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Response to Amendment

2. This communication is responsive to the applicant's amendment dated 01/03/2011. The applicant(s) amended claims 1, 12, and 17.

3. The Examiner withdraws the claim objection to claim 17 in accordance with the Applicant's amendment.

4. The Examiner withdraws the claim rejections under 35 USC 101 in accordance with the Applicant's amended claim limitations, which now recite the method as being performed in an apparatus.

Response to Arguments

5. Applicant's arguments with respect to claims 1-22 have been considered but are moot in view of the new ground(s) of rejection because amended claim(s) introduced new issue(s). See rejection below.

6. It is noted that the previously cited references are still applicable to amended claims for prior art rejections. See rejection below.

7. In response to the Applicant's argument with respect to claim(s) 1 rejected under 35 U.S.C. 103 that "Equation 1 pertains to the entire band of the signal, and not to the part of said x(t) that is inside a particular cochlear filter band, as claim 1 specifies"

(Remarks, pg. 7), the Examiner respectfully notes that the Hilbert envelope (pg. 6, Eq. 1) is split into different bands via bandpass filters with center frequencies ranging from 1500 Hz to 4000 Hz (pg. 6, top paragraph). Therefore, the envelope is essentially inside a particular cochlear filter band.

8. In response to the Applicant's argument with respect to claim(s) 1 rejected under 35 U.S.C. 103 that "Thus, what the Examiner calls "measure of roughness" is not a measure of any roughness; and it certainly is not the measure of roughness as the term is used in applicants' specification." (Remarks, pg. 8), the Examiner respectfully disagrees. The claim limitation being argued recites "quantifying a roughness measure for said envelope." The autocorrelation of the spectrum taught by Herre can be interpreted as a type of "roughness" measurement, in view of the broadest reasonable interpretation, which reads on the claim limitations. Further, although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

9. In response to the Applicant's argument with respect to claim(s) 1 rejected under 35 U.S.C. 103 that "It is true that the Brandenburg reference teaches how to compute NMRs, but that computation, beginning in the right column of page 173, does not use anything akin to a roughness measure in order to compute NMRs, and certainly does not use the roughness measure that claim 1 specifies" (Remarks, pg. 8), the Examiner respectfully disagrees. As noted in the previous Office Action, BRANDENBURG discloses "determining Noise Masking Ratios" (in PG. 173, RIGHT COL.), which involves computation of the power spectra and noise (frequency domain) and grouping

into critical bands (cochlear band). In addition, BRANDENBURG teaches a display of energy, estimated masking threshold and noise in the dB and Bark Scale axes (in pg. 176, Fig. 10). Given the teachings above, it would have been obvious to one of ordinary skill in the art to combine the teachings of roughness measure taught by Herre with the teachings of NMR as taught by Brandenburg in order to perform in the same manner with predictable results.

In addition, Brandenburg's teachings in pg. 176, Fig. 10 would easily allow one of ordinary skill in the art to measure the roughness of an envelope given that the energies of the signals are displayed in the dB vs. Bark scale, a well-known psychoacoustic scale which corresponds to the first 24 critical bands of hearing. The 24 critical bands are interpreted as being cochlear filter bands.

10. Regarding the arguments to claim 12 (Remarks, pg. 9), see response to arguments with respect to claim 1 above.

11. In response to the Applicant's arguments with respect to claims 2 and 13 that "There is no suggestion in Herre that the square of the Hilbert envelope ought to be used as the quantity whose roughness is quantified" (Remarks, pg. 4), the Examiner respectfully disagrees. Herre on pg. 15 teaches "the signal envelope is directly connected to the autocorrelation in the spectral domain", the signal envelope which is squared (4^{th} Equation). Therefore, Herre does in fact suggest that the square of the envelope signal should be used for the roughness measure. Further, e(t) is clearly taught as being an absolute value of the envelope signal, which is essentially the signal

c(t) squared. Lastly, given the teachings above, the claimed limitations would have been found as obvious to one of ordinary skill in the art at the time of the invention.

12. Regarding the arguments to claims 3 and 14 (Remarks, pg. 9), see response to arguments with respect to claims 2 and 13 above.

13. In response to the Applicant's arguments with respect to claims 4 and 15 that Herre does not address cochlear filters (Remarks, pg. 9), the Examiner respectfully disagrees. Herre teaches that several filters can be used for Temporal Noise Shaping (pg. 13, 4th bullet pt.). These filters refer to the bandpass filters which separate the signal into critical bands (pg. 7, 1st par.) (also taught by Brandenburg, see above), critical bands corresponding to the frequency range audible to the human ear (cochlear). Given the evidence above, the claim limitations are obvious through the combination of Herre in view of Brandenburg.

14. Regarding the arguments to claims 5 and 16 (Remarks, pg. 10), see response to arguments with respect to claims 2, 13, 3, and 14 above.

15. In response to the Applicant's arguments with respect to claims 6 and 17 that "While this teaches that linear predictive coding of spectral data may be used, it is certainly not a teaching that linear prediction of the time function ei(t) is or ought to be used to create a roughness measure. Therefore, it is believed that claims 6 and 17 are not obvious in view of the Herre and Brandenburg combination of references" (Remarks, pg. 10), the Examiner respectfully disagrees. The fact that linear predictive coding of the spectra may be used is concrete evidence that the claimed feature of

performing linear prediction to the envelope would have been obvious to one of ordinary skill in the art through the combination of Herre in view of Brandenburg.

16. In response to the Applicant's arguments with respect to claim 10 that "There has to be some reason to recognize that the power 8 is obvious in light of some teachings, before a valid rejection can be asserted" (Remarks, pg. 10), the Examiner notes that the log of the noise density divided by the mask density taught by Brandenburg (pg. 174, 'NMR, SEGNMR, masking flag') is a result of the power spectra of the signal and noise (which is the original signal squared) (pg. 173, right col., 3rd bullet) squared again (pg. 173, right col.; signal intensity), resulting in an original signal and noise raised to the 4th power (2*2). Given the evidence above, one of ordinary skill in the art at the time of the invention would have found the claim limitation obvious through the combination of Herre in view of Brandenburg. The resulting dB calculation taught by Brandenburg would have also prompted other variations in measurement, e.g., squaring again, for the purpose of improving the NMR calculation (Brandenburg, pg. 176, Conclusions).

17. Regarding the arguments to claim 11 (Remarks, pg. 10), see response to arguments with respect to claims 6 and 10 above.

18. In response to the Applicant's arguments with respect to claims 7-9 and 18-22 that "claims 7 and 18 are not obvious in view of Herre, Brandenburg, and Smyth combination of references" (Remarks, pg. 11), the Examiner respectfully disagrees. Upon further analysis, Brandenburg teaches that the current drawback of the NMR and masking flag calculations is that no tonality estimation is present (pg. 177, 'Shortcomings of the current version'). Given the teachings already mentioned in the

previous Office Action, one of ordinary skill in the art would have found the claimed feature of normalizing the roughness measure with respect to a roughness measure of a pure tone obvious through the combination of Herre in view of Brandenburg and Smyth. It is noted that the references as a whole must be considered.

Claim Rejections - 35 USC § 103

19. **Claims 1-6, 10-17** are rejected under 35 U.S.C. 103(a) as being unpatentable over **J. Herre et al. (hereinafter referred to as Herre) ("Enchancing the Performance of Perceptual Audio Coders by Using Temporal Noise Shaping (TNS)") in view of K. Brandenburg et al. (hereinafter referred to as Brandenburg) ("NMR" and "Masking Flag": Evaluation of Quality Using Perceptual Criteria).**

Regarding **claim 1**, **Herre** discloses:

"A perceptual model" (in **PG. 1, INTRO**; 'Perceptual audio coders have been developed…' Perceptual audio coding comprises perceptual model.);

"audio signals x(t) in each cochlea filter band" (in **PG. 2, LAST PAR.**; The generic coder structure of a perceptual coder exploits the irrelevancy contained in each signal due to the limitations of the human auditory system (cochlear)) and (in **PG. 7, TOP**; FIG.9 shows the Hilbert envelopes for these bandpass signals, each of a width of 500 Hz, with center frequencies ranging from 1500 Hz to 4000 Hz.) and (in **PG. 2, LAST PAR.**; The perceptual audio coder is based on the human auditory system).

“determining a representation of the envelope of the part of said x(t) that is inside a particular cochlea filter band” (in **PG. 6, EQ.1**; EQ.1 shows a formula describing the Hilbert envelope, e(t).);

“quantifying a roughness measure for said envelope” (in **PG. 6, EQ.2**; EQ.2 discloses a formula relating the power spectral density of a signal to its autocorrelation function, which describes the roughness measure for said envelope in light of the specification (see JOHNSTON, PG. 5, LINES 25-27));

“mapping said roughness measure to a NMR for the part of the signal that is inside said particular cochlear filter band” (in **PG. 2**; The spectral values are quantized (mapped) and coded according to the precision corresponding to the masked threshold estimate.);

<u>MDCT</u> (**Herre: pg. 3, 3rd par.**; ‘1024 point MDCT.’).

However, **Herre** does not expressly disclose the feature of Noise Masking Ratios, as in “<u>employing said NRM for the part of the signal that is inside said particular filter cochlear band to quantize modified discrete cosine transform (MDCT) coefficients of said signal</u>”

In the same field of endeavor (methods for perceptual coding), **Brandenburg** discloses:

Noise Masking Ratios (in **PG. 173, RIGHT COL.**; Disclosed is the computation of the Noise-to-Mask Ratio.);

“employing said NRM” (see above), “for the part of the signal that is inside said particular filter cochlear band”, (in **pg. 176, Fig. 10**; The energies of the signals are

displayed in the dB vs. Bark scale, a well-known psychoacoustic scale which corresponds to the first 24 critical bands of hearing. The 24 critical bands are interpreted as being cochlear filter bands.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify **Herre's** perceptual audio coder with **Brandenburg's** method of using noise masking ratios. In addition, **Brandenburg's** advanced measurement techniques pertain modeling the human auditory system (see Brandenburg, PG. 172). Further, it would have been obvious to combine the teachings of MDCT and roughness measurement (taught by Herre) with the teachings of NMR (taught by Brandenburg) to perform in the same manner. Herre and Brandenburg are analogous in perceptual coding/human auditory hearing. (See also arguments in Response to Arguments)

For the purpose of motivation and based on above teachings, one ordinarily skilled in the art would recognize that the combination would provide less computational complexity for the measurement technique as well as easy and accurate implementation. See Brandenburg, PG. 173, NMR and 'masking flag'.

Regarding **claims 2 and 13 (dep. on claims 1 and 12 respectively)**, **Herre (in view of Brandenburg)** discloses "determining a representation of the envelope comprises determining e(t), the square of said envelope" (**Herre**, in **PG. 15, 4th EQUATION**; e(t) is equivalent to the square of the envelope.).

Regarding **claims 3 and 14 (dep. on claims 1 and 12 respectively)**, **Herre (in view of Brandenburg)** discloses "said determining a representation of said envelope

comprises determining ~ (.function.), where X(.function.) is the Fourier transform of x(t), and ~ (.function.) is the Fourier transform of the analytic signal corresponding to x(t), ~ (.function.) being a single sided frequency spectrum defined as [image] for .function. extending over a frequency range associated with a human cochlea" (**Herre**, in **PG. 15, 3rd EQUATION**; C(f) is equivalent to the one sided frequency spectrum, similar to what the instant application's claim recites.).

Regarding **claims 4 and 15 (dep. on claims 3 and 14 respectively)**, **Herre (in view of Brandenburg)** discloses "filtering said ~ (.function.) by a cochlear filter, H i (.function.), for i = 1, 2, ... N to form representations of said single-sided frequency spectrum for N discrete bands of said frequency range, said representations given by ~i(.function.)=~(.function.)H i(.function.)" (**Herre**, in **PG. 13, 4th BULLET PT.**; 'It is possible to use several filters operating on distinct frequency (coefficient) regions.' These frequency regions are the regions most pertaining to the human auditory system.).

Regarding **claims 5 and 16 (dep. on claims 4 and 15 respectively)**, **Herre (in view of Brandenburg)** discloses "said determining said envelope further comprises determining e i(t) for said N discrete bands in accordance with e i(t)=F-1{[integral]~i([epsilon]).~~([epsilon]-.function.)d[epsilon]} where e i(t) is the square of said signal envelope corresponding to the ith cochlea filter band having a characteristic frequency .function.i." (**Herre**, in **PG. 15**; The signal envelope is connected to the autocorrelation in the frequency domain. The e(t) disclosed by Herre is similar to the e i(t) recited in the instant application's claim.).

Regarding **claims 6 and 17 (dep. on claims 5 and 16 respectively)**, **Herre (in view of Brandenburg)** discloses “said quantifying a roughness measure for said envelope comprises performing a linear prediction of said envelope, e i(t) for each i to determine corresponding banded roughness measures r s(i)” (**Herre**, in **PG. 7, 2nd PAR.**; Linear predictive coding (LPC) is applied to signal in the frequency domain, which is the domain where the roughness of the envelope is measured.).

Regarding **claim 10 (dep. on claim 6)**, the claim recites “said mapping said roughness measure for each cochlear band i to a NMR comprises determining [image] where r t(i) is the roughness measure for a pure tone for each i, and c is a constant.”

Herre (in view of Brandenburg and Smyth) discloses (**Brandenburg**, in **PG. 174, 'NMR, SEGNMR, masking flag'**; The local noise to masking ratio is equivalent to the log of the noise density (roughness measure) divided by the mask density.).

The idea of measurement manipulation (raising the roughness measure to another power) is based on the same or similar principle as taking the log of the ratio, as taught by Brandenburg. Therefore, raising the squared normalized roughness value to the 4th power would have been obvious to one of ordinary skill in the art at the time of the invention was made. Known work in one field of endeavor (taking the log of the density ratio) may prompt variations of it (raising roughness measure to another power) for use in other the same field (perceptual coding) based on design incentives since the variations are predictable to one of ordinary skill in the art.

Regarding **claim 11 (dep. on claim 10)**, **Herre (in view of Brandenburg)** discloses “said constant, c, is determined by performing a linear prediction of the

envelope, e i(t) for each I" (**Herre**, in **PG. 7, 2nd PAR.**; Linear predictive coding (LPC) is applied to signal in the frequency domain, which is the domain where the roughness of the envelope is measured.);

"for a white noise input signal" (**Brandenburg**, in **PG. 169, FIG.1**; White noise, '13-dB miracle'.);

"thereby determining corresponding banded roughness measures r n(i)" (**Brandenburg**, in **PG. 172, NOISE LOUDNESS**; The power density spectract (roughness) is calculated for the noise signal.);

"substituting said r n(i) values for r s(i) in [image]" (**Brandenburg**, in **PG. 169, FIG.1**; White noise, '13-dB miracle'. Instead of an arbitrary signal as the input, the disclosed white noise will be inputted.);

"substituting known theoretical values for NMR i for white noise in the immediately preceding equation, thereby determining a value, c i, for each I" (**Brandenburg**, in **PG. 174, RIGHT**; NMR is equivalent to the noise density (roughness of the white noise) divided by the mask density (pure tone)) and (**Brandenburg**, in **PG. 172, KNOWN ADVANCED…**; 'All systems use the original signal to derive an estimated masking threshold (theoretical). This is then compared to the actual noise signal or the signal under test. A distortion measure is derived from the result of the comparison.' The Examiner interprets the c in the instant application as the disclosed distortion measure. There is a comparison performed between actual measurements and theoretical measurements, similar to the instant application's substitution of theoretical NMR values in the equation in order to find c.);

"averaging said values of c i for all i to determine said value for c" (**Brandenburg**, in **PG. 174**; The mean NMR is calculated and defined by NMRSEG.).

Regarding **claim 12**, **Herre** discloses:

"A method for coding audio signals x(t) in the frequency domain" (in **PG. 6**; Thus, the squared Hilbert envelope of a signal and power spectral density constitute dual aspects in time and frequency domain.);

"for each band of a cochlear filter having a plurality of bands" (in **PG. 13, LAST BULLET**; It is possible to use to use several filters operating on distinct frequency regions.);

"determining a representation of the envelope of the part of said x(t) that is inside a particular cochlea filter band" (in **PG. 6, EQ.1**; EQ.1 shows a formula describing the Hilbert envelope, e(t).);

"quantifying a roughness measure for said envelope" (in **PG. 6, EQ.2**; EQ.2 discloses a formula relating the power spectral density of a signal to its autocorrelation function, which describes the roughness measure for said envelope in light of the specification (see JOHNSTON, PG. 5, LINES 25-27));

"mapping said roughness measure to a Noise Masking Ratio, NMR, for the part of x(t) that is inside said particular cochlear filter band" (in **PG. 2**; The spectral values are quantized (mapped) and coded according to the precision corresponding to the masked threshold estimate.).

"quantizing said audio signals in the frequency domain using said NMRs to determine quantizing levels" (in **PG. 2**; The spectral values are quantized (mapped) and coded according to the precision corresponding to the masked threshold estimate.).

However, **Herre** does not expressly disclose "determining Noise Masking Ratios."

In the same field of endeavor (methods for perceptual coding), **Brandenburg** discloses "determining Noise Masking Ratios" (in **PG. 173, RIGHT COL.**; Disclosed is the computation of the Noise-to-Mask Ratio.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify **Herre's** perceptual audio coder with **Brandenburg's** method of using noise masking ratios. In addition, **Brandenburg's** advanced measurement techniques pertain modeling the human auditory system (see Brandenburg, PG. 172).

20. **Claims 7-9 and 18-22** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Herre (in view of Brandenburg)** as applied to claims 6 and 17 above, and further in view of **Smyth (5,956,674)**.

Regarding **claims 7 and 18 (dep. on claims 6 and 7 respectively)**, **Herre (in view of Brandenburg)** discloses "said mapping said roughness measure to a NMR comprises normalizing said r s(i), for each i, to form a normalized roughness measure for each i" (**Herre**, in **FIG. 9 and PG. 7, TOP**; All envelopes are normalized in their maximum amplitudes. See FIG. 9 as well.).

However, **Herre (in view of Brandenburg) does not** expressly disclose "with respect to a roughness measure for a pure tone, r t(i), for each i, t."

In the same field of endeavor (subband audio coder, see ABSTRACT), **Smyth** discloses (in **COL. 24, LINES 33-37**; The prediction gain within each subband can be mapped to a set of tonality ratios such that a sine wave and white noise in any subband produce prediction gains that have tonality ratios of 1.0 and 0.0 respectively.).

Smyth discloses mapping prediction gains (i.e., roughness measure, in light of specification, see instant application, PG. 8) for a sine wave (pure tone). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify **Herre's (in view of Brandenburg)** signal roughness measure normalization in respect to a prediction gain (roughness measure) of a sine wave, as taught by **Smyth**.

For the purpose of motivation and based on above teachings, one ordinarily skilled in the art would recognize that the combination provides a multi-channel audio coder with the flexibility to accommodate a wide range or compression levels and improved perceptual quality. See Smyth, COL. 3, LINES 13-19.

Regarding **claims 8 and 19 (dep. on claims 7 and 18 respectively)**, **Herre (in view of Brandenburg and Smyth)** discloses "said mapping said roughness measure to a NMR further comprises squaring said normalized roughness measure for each i to form a squared roughness measure for each I" **(Herre**, in **PG. 8, 4th PAR.**; Disclosed in this section is Temporal Noise Shaping via Prediction in the Spectral Domain. 'A reduction of residual energy depends on the "squared-envelope flatness measure" of the signal.' The signal (in frequency domain) is squared.).

Regarding **claims 9 and 20 (dep. on claims 8 and 19 respectively)**, the claim recites “said squared roughness measure is raised to the 4th power to reflect cochlea compression.” **Herre (in view of Brandenburg and Smyth)** discloses (**Brandenburg**, in **PG. 174, 'NMR, SEGNMR, masking flag'**; The local noise to masking ratio is equivalent to the log of the noise density (roughness measure) divided by the mask density.).

The idea of measurement manipulation (raising the roughness measure to another power) is based on the same or similar principle as taking the log of the ratio, as taught by Brandenburg. Therefore, raising the squared normalized roughness value to the 4^{th} power would have been obvious to one of ordinary skill in the art at the time of the invention was made. Known work in one field of endeavor (taking the log of the density ratio) may prompt variations of it (raising roughness measure to another power) for use in other the same field (perceptual coding) based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art.

Regarding **claim 21 (dep. on claim 19)**, the claim recites “said mapping said roughness measure for each cochlear band i to a NMR comprises determining [image] where r t(i) is the roughness measure for a pure tone for each i, and c is a constant.”

Herre (in view of Brandenburg and Smyth) discloses (**Brandenburg**, in **PG. 174, 'NMR, SEGNMR, masking flag'**; The local noise to masking ratio is equivalent to the log of the noise density (roughness measure) divided by the mask density.).

The idea of measurement manipulation (raising the roughness measure to another power) is based on the same or similar principle as taking the log of the ratio,

as taught by Brandenburg. Therefore, raising the squared normalized roughness value to the 4th power would have been obvious to one of ordinary skill in the art at the time of the invention was made. Known work in one field of endeavor (taking the log of the density ratio) may prompt variations of it (raising roughness measure to another power) for use in other the same field (perceptual coding) based on design incentives since the variations are predictable to one of ordinary skill in the art.

Regarding **claim 22 (dep. on claim 21)**, **Herre (in view of Brandenburg and Smyth)** discloses “said constant, c, is determined by performing a linear prediction of the envelope, e i(t) for each I” (**Herre**, in **PG. 7, 2nd PAR.**; Linear predictive coding (LPC) is applied to signal in the frequency domain, which is the domain where the roughness of the envelope is measured.);

“for a white noise input signal” (**Brandenburg**, in **PG. 169, FIG.1**; White noise, ’13-dB miracle’.);

“thereby determining corresponding banded roughness measures r n(i)” (**Brandenburg**, in **PG. 172, NOISE LOUDNESS**; The power density spectra (roughness) is calculated for the noise signal.);

“substituting said r n(i) values for r s(i) in [image]” (**Brandenburg**, in **PG. 169, FIG.1**; White noise, ’13-dB miracle’. Instead of an arbitrary signal as the input, the disclosed white noise will be inputted.);

“substituting known theoretical values for NMR i for white noise in the immediately preceding equation, thereby determining a value, c i, for each I” (**Brandenburg**, in **PG. 174, RIGHT**; NMR is equivalent to the noise density (roughness

of the white noise) divided by the mask density (pure tone)) and (**Brandenburg**, in **PG. 172, KNOWN ADVANCED…**; ‘All systems use the original signal to derive an estimated masking threshold (theoretical). This is then compared to the actual noise signal or the signal under test. A distortion measure is derived from the result of the comparison.’ The Examiner interprets the c in the instant application as the disclosed distortion measure. There is a comparison performed between actual measurements and theoretical measurements, similar to the instant application’s substitution of theoretical NMR values in the equation in order to find c.);

“averaging said values of c i for all i to determine said value for c” (**Brandenburg**, in **PG. 174**; The mean NMR is calculated and defined by NMRSEG.).

Conclusion

21. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARK VILLENA whose telephone number is (571) 270-3191. The examiner can normally be reached on M - Th 9:00 - 6:30, F 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, RICHEMOND DORVIL can be reached on (571) 272-7602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MARK VILLENA
Examiner
Art Unit 2626

/ QI HAN/
Primary Examiner, Art Unit 2626